

NOTES ON THE VARIATION OF SOME SPECIES OF THE GENUS NOTROPIS.

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In this paper the results of the range of variation in the important or fundamental characters of a majority of the species of this genus are presented. Most all of the material examined in this connection is exclusive of that already published in my Synopsis of the Cyprinidæ of Pennsylvania, and is contained in the collections of the Academy of Natural Sciences of Philadelphia. Many of the specimens are the types of Girard and Cope and as the published accounts and figures are insufficient or incomplete, it is hoped that the notes and figures given upon each species will be of use in future determinations. Little, if any attention, in most cases, seems to have been paid to the extent of variation in the species of this genus, so that often dogmatic and compiled descriptions of some writers are very unsatisfactory, especially when based on the examination of a single example. The determination of the species is thus often very difficult, especially in such a large genus as the present, and where age, sex and the individual often vary greatly. No attempt is made in any way to alter the limits of the genus from those prescribed by Jordan and Evermann.

Notropis aztecus Woolman.

Head 4; depth $3\frac{2}{3}$; D. iii, 7, 1; A. iii, 6, 1; scales 46? + 2; 8 scales above l. 1.; 6 scales below l. 1.; 25 predorsal scales; snout $3\frac{3}{4}$ in head; eye 5; maxillary $3\frac{3}{5}$; interorbital $2\frac{7}{8}$; teeth 4-4; length $3\frac{3}{4}$ inches. One from L. Xochimilco, Mex.

Notropis bifrenatus (Cope). Pl. XV, fig. 1.

Head $3\frac{1}{4}$ to $4\frac{1}{3}$; depth $3\frac{2}{5}$ to $5\frac{3}{4}$; D. iii, 7, 1, rarely iii, 6, 1; A. iii, 6, 1; scales 28 to 35 + usually 2, frequently 3, rarely 1; 5 or 6 scales above incomplete l. 1.; 4 or 5 scales below l. 1.; usually 12, frequently 11, sometimes 13, occasionally 10 or 14 predorsal scales; snout $3\frac{1}{5}$ to $4\frac{1}{4}$ in head; eye $2\frac{1}{3}$ to $3\frac{1}{3}$; maxillary $3\frac{1}{5}$ to $4\frac{1}{4}$; interorbital $2\frac{1}{5}$ to 3; teeth 4-4; length $1\frac{5}{8}$ to $2\frac{3}{8}$ inches. Very large series, of which 52 examined from Ridgewood, Budd's Lake, Trenton, Turnersville, Pensauken, Mantua, Florence, Crosswicks Creek. N. J.

Notropis cayuga Meek. Pl. XV, fig. 2.

Two from Silver Lake and one from Brook River, Ia., the latter long ago named as new by Cope in MS.

Notropis cayuga atrocaudalis Evermann.

Head $3\frac{1}{5}$ to $4\frac{1}{8}$; depth $3\frac{1}{4}$ to 4; D. iii, 7, 1; A. iii, 6, 1; scales usually 35, frequently 34, often 36 + usually 2, seldom 3; 6 scales above l. l.; usually 5 scales below l. l., rarely 4 or 6; usually 15 predorsal scales, often 16; snout $3\frac{1}{4}$ to 4 in head; eye $3\frac{1}{4}$ to 4; maxillary $3\frac{1}{5}$ to $3\frac{1}{2}$; interorbital $2\frac{1}{4}$ to 3; teeth 4-4; length 2 to 3 inches. Thirteen from Palestine, Tex.

Notropis fretensis (Cope). Pl. XV, fig. 3.

Hybopsis fretensis Cope, Tr. Am. Philos. Soc. Phila., (2) XIII, 1866, p. 382. Near Detroit, Mich.

Type of *H. fretensis*. It is not at all likely this species may be identical with *N. cayuga*, as suggested by Jordan and Evermann.

Notropis deliciosus (Girard). Pl. XV, figs. 4-6.

Moniana deliciosa Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 199. Leon River, trib. Rio San Antonio, Tex.

Hybognathus stramineus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 283. Grosse Isle, Mich.

Hybopsis missuriensis Cope, Prelim. Rep. U. S. Geol. Sur., 1870 (1871), p. 437. St. Joseph, Mo.

Head $3\frac{2}{7}$ to $4\frac{1}{5}$; depth $3\frac{7}{8}$ to 5; D. iii, 7, 1, rarely iii, 5, 1; A. iii, 6, 1; scales usually 33 or 35, frequently 34, seldom 30 or 32, rarely 36 or 37 + usually 2, rarely 3; usually 5 scales above l. l., seldom 6; 4 scales below l. l.; usually 16 predorsal scales, frequently 15, often 14, occasionally 17, seldom 18, rarely 13; snout 3 to $3\frac{7}{8}$ in head; eye $2\frac{3}{4}$ to $3\frac{2}{5}$; maxillary $2\frac{7}{8}$ to $3\frac{1}{4}$; interorbital $2\frac{2}{3}$ to $3\frac{1}{5}$; teeth 4-4; length $1\frac{1}{4}$ to $2\frac{3}{4}$ inches. Cotype of *M. deliciosa*, 6 of *H. stramineus* (type No. 4, 131, A. N. S. P.) and 4 of *H. missuriensis* (type No. 4,374, A. N. S. P.). Also 123 examples, from Grosse Isle and Houghton Lake, Mich.; Calhoun and Chariton, Mo.; Wichita River, Tex.

Notropis volucellus (Cope). Pl. XV, fig. 7.

Head $3\frac{1}{2}$ to $3\frac{7}{8}$; depth $4\frac{1}{5}$ to $4\frac{7}{8}$; D. iii, 7, 1; A. iii, 7, 1, rarely iii, 8, 1; scales usually 32, often 33 or 34, rarely 30 or 31 + usually 2, rarely 3; usually 5 scales above l. l., rarely 6; usually 4 scales below l. l., rarely 5; usually 13 or 14 predorsal scales, frequently 12 or 15; snout $3\frac{1}{8}$ to $4\frac{1}{8}$ in head; eye $3\frac{1}{8}$ to $3\frac{1}{4}$; maxillary $3\frac{3}{4}$ to 4; interorbital $2\frac{1}{2}$ to 3; teeth 4-4; length $2\frac{1}{4}$ to $2\frac{7}{16}$ inches. Ten from Hicksville, O.

Notropis procne (Cope). Pl. XV, fig. 8.

Hybognathus procne Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 283. Conestoga Creek, Pa.

Cotypes of *H. procne* 11, and an example from Stony Run in Cecil County, Md.

Notropis procne longiceps (Cope). Pl. XVI, fig. 9.

Hybopsis longiceps Cope, Journ. Acad. Nat. Sci. Phila., (2) VI, 1868 (December), p. 231. Headwaters of Roanoke and James Rivers, Va.

Head $3\frac{2}{3}$ to $4\frac{3}{4}$; depth $4\frac{1}{4}$ to $5\frac{3}{4}$; D. iii, 7, 1; A. usually iii, 6, 1, occasionally iii, 7, 1; scales usually 32, frequently 33, occasionally 31, seldom 34, rarely 29 or 30 + usually 2, rarely 1 or 3; 5 scales above l. l., rarely 4; 4 scales below l. l.; usually 12 or 13 predorsal scales, often 14, occasionally 15; snout $3\frac{1}{8}$ to $3\frac{3}{4}$ in head; eye $2\frac{2}{3}$ to $3\frac{1}{3}$; maxillary $2\frac{7}{8}$ to $3\frac{3}{4}$; interorbital $2\frac{1}{3}$ to $3\frac{1}{4}$; teeth 4-4; length $1\frac{11}{16}$ to $2\frac{13}{16}$ inches. Cotypes of *H. longiceps* 18 (type No. 4,108, A. N. S. P.). Also 52 examples, from Coal Creek and S. Fork of Cumberland River, Tenn.; Yadkin River, N. C.; James River?, Va. This form has generally been identified with the preceding, but seems to differ somewhat in its more slender body.

Notropis spectrunculus (Cope).

Hybopsis spectrunculus Cope, Journ. Acad. Nat. Sci. Phila. (2). VI, 1868 (December), p. 231, Pl. 22, figs. 3-3a. Bear Creek, Holston River basin, Va.

Head $3\frac{3}{8}$ to $4\frac{1}{8}$; depth $4\frac{2}{3}$ to (6?) $5\frac{1}{3}$; D. iii, 7, 1; A. usually iii, 7, 1, seldom iii, 8, 1; scales usually 36, frequently 35, seldom 34 + usually 2, rarely 1; 5 scales above l. l.; 4 scales below l. l.; usually 13 predorsal scales, often 15, sometimes 16, rarely 14 or 17?; snout $3\frac{1}{8}$ to $3\frac{1}{2}$ in head; eye $2\frac{1}{2}$ to 3; maxillary $2\frac{1}{3}$ to $3\frac{1}{3}$; interorbital $2\frac{1}{4}$ to $3\frac{1}{2}$; teeth 4-4; length 2 to $2\frac{1}{2}$ inches. Cotypes of *H. spectrunculus* 11 (type No. 4,363, A. N. S. P.). Also 10 examples, from French Broad River and Henderson County, N. C.; Kanawha basin (?), Va. Cope's figure shows only 6 developed branched rays.

Notropis blennioides (Girard). Pl. XVI, fig. 10.

Alburnops blennioides Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 194. Arkansas River near Ft. Smith.

Cotype of *A. blennioides*, agreeing in most particulars with Girard's accounts, and is unquestionably the fish he calls *A. blennioides*, whatever others may be confused, as he mentions 18 examples. Jordan gives¹ the teeth of one of Girard's examples as 1, 4-4, 0, which, if not broken, would suggest something different.

¹ Proc. U. S. Nat. Mus., 1885, p. 123.

Head $3\frac{5}{7}$ to $3\frac{2}{3}$; depth 4 to $4\frac{1}{2}$; D. iii, 7, 1; A. iii, 6, 1; scales 32 to 35 + 2; 5 or 6 scales above l. l.; 3 or 4 scales below l. l.; 13 or 14 predorsal scales; snout $3\frac{2}{5}$ to $3\frac{3}{4}$ in head; eye $3\frac{1}{5}$ to $3\frac{1}{4}$; maxillary $2\frac{2}{3}$ to 3; interorbital 3 to $3\frac{1}{10}$; teeth 2, 4-4, 2; length $2\frac{1}{5}$ to $2\frac{1}{16}$ inches. Two examples from Blue River, Indiana.

Notropis illecebrosus (Girard). Pl. XVI, fig. 11.

Alburnops illecebrosus Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 194.
Arkansas River, near Fort Smith.

Cotype of *A. illecebrosus*. The fish called *N. illecebrosus* by Jordan and Evermann², to which is added "description here drawn up from the types" is confusing, as they give: A. 8; scales 7-35; 11 predorsal scales; teeth 1, 4-4, 1; all of which is not in agreement with my example, as may be seen by Meek's notes. This latter may be considered unquestionably the type of the present species, as Meek is the first to restrict it, therefore, while specimens of *A. shumardi* may be identical as suggested by Jordan and Gilbert,³ it is not possible to so determine, as Jordan had already stated that the types of *A. shumardi* were lost. However, if the two are ever demonstrated to be identical, the name *shumardi* has precedence.

Notropis gilberti Jordan and Meek. Pl. XVI, fig. 12.

Proc. U. S. Nat. Mus., 1885, p. 4. Village Creek, Ia.

Head $3\frac{1}{5}$ to $3\frac{2}{5}$; depth $3\frac{4}{7}$ to $4\frac{2}{5}$; D. iii, 7, 1, rarely iii, 6, 1; A. usually iii, 7, 1, seldom iii, 6, 1, rarely iii, 8, 1; scales usually 30 or 33, seldom 31, 32, 34 or 35 + usually 2, rarely 1; usually 6 scales above l. l., occasionally 5, rarely 7; 5 scales below l. l.; usually 15 or 17 predorsal scales, sometimes 16, rarely 13, 14 or 18; snout $3\frac{1}{10}$ to $3\frac{1}{4}$ in head; eye $3\frac{1}{10}$ to $3\frac{4}{5}$; maxillary $2\frac{2}{3}$ to $3\frac{1}{10}$; interorbital $2\frac{3}{4}$ to $3\frac{1}{2}$; teeth 1, 4-4, 1; length $2\frac{1}{16}$ to $2\frac{9}{16}$ inches. Seven cotypes of *N. gilberti*, besides 5 examples from Adel and Chariton, Ia.

Notropis nux Evermann.

Head $3\frac{1}{3}$ to 4; depth $3\frac{1}{2}$ to $4\frac{1}{3}$; D. iii, 7, 1; A. iii, 6, 1; scales usually 33, occasionally 32 or 34 + 2; 6 scales above l. l., rarely 5; 4 scales below l. l., rarely 5; 13 or 14 predorsal scales; snout 3 to $3\frac{2}{3}$ in head; eye $3\frac{1}{4}$ to $3\frac{7}{5}$; maxillary $2\frac{7}{5}$ to $3\frac{2}{5}$; interorbital $2\frac{1}{2}$ to $3\frac{1}{8}$; teeth 1, 4-4, 1, rarely 1, 3-4, 1; length $2\frac{3}{16}$ to $2\frac{15}{16}$ inches. Thirty examples from Beaumont and Del Rio, Tex. The latter wrongly called *N. blennioides* by me.⁴

² Bull. U. S. Nat. Mus., No. 47, I, 1896, p. 268.

³ L. c., No. 16, 1882, p. 193.

⁴ Proc. Acad. Nat. Sci. Phila., 1904, p. 244.

Notropis boops Gilbert. Pl. XVI, fig. 13.

Head $3\frac{3}{4}$ to 4; depth 4 to $4\frac{2}{5}$; D. iii, 7, 1; A. iii, 7, 1; scales usually 32, sometimes 34, rarely 33, 35 or 36 + 2, rarely 3; usually 5 scales above l. l., rarely 6; usually 3 scales below l. l., occasionally 4; 13 to 15 predorsal scales, rarely 12; snout $3\frac{1}{4}$ to 4 in head; eye $2\frac{3}{5}$ to $3\frac{1}{2}$; maxillary $2\frac{3}{4}$ to $3\frac{1}{3}$; interorbital $2\frac{1}{4}$ to $3\frac{1}{3}$; teeth usually 0, 4-4, 0, occasionally 1, 4-4, 1, rarely 0, 4-4, 1; length $1\frac{2}{5}$ to $2\frac{2}{5}$ inches. Twenty-eight examples from Blue River, Ind., and Limestone Gap, Indian Ter. The former in some cases show inner edges of grooves on pharyngeal teeth crenate, but differ from Gilbert's account in that 23 show uniserial teeth and all have 8 (iii, 7, 1) branched anal rays. There are mostly 3 scales below l. l. Limestone Gap examples show smooth pharyngeal teeth, dorsal origin distinctly behind ventral origin or midway between snout tip and caudal base, l. l. very slightly decurved, and 14 or 15 predorsal scales. I do not now think these examples can be identical with *Alburnnops shumardi* Girard,⁵ though previously listed them so, as it was virtually supposed to have teeth 2, 4-4, 2 or 1, 4-4, 2, besides minor characters. The figure⁶ is faulty, showing maxillary to eye center, mandible included, breast naked, 7 scales above l. l. (his description says 5), 5 scales below l. l. (his description says 3).

Notropis hudsonius (Clinton).

Head $3\frac{2}{3}$ to $4\frac{1}{4}$; depth $3\frac{3}{4}$ to 5; D. iii, 7, 1, rarely iii, 8, 1; A. iii, 7, 1, rarely iii, 6, 1 or iii, 8, 1; scales usually 37, often 36, sometimes 35, seldom 34 or 38, rarely 39 or 40 + usually 2, seldom 3; usually 6 scales above l. l., seldom 5; usually 4 scales below l. l., frequently 5; usually 16 predorsal scales, frequently 14 or 15, seldom 17, rarely 13 or 18; snout $3\frac{1}{5}$ to $3\frac{7}{8}$ in head; eye $2\frac{1}{3}$ to $3\frac{2}{3}$; maxillary $2\frac{2}{3}$ to 4; interorbital $2\frac{2}{5}$ to $3\frac{1}{5}$; teeth usually 2, 4-4, 1, sometimes 0, 4-4, 1, occasionally 1, 4-4, 2, seldom 1, 4-4, 1, rarely 2, 4-4, 0 or 1, 4-4, 0 or 2, 5-4, 1; length $1\frac{1}{2}$ to $3\frac{1}{2}$ inches. Seventy examples, from Berkshire Hills, Mass.; Holston River, Va.; Port Clinton, O.; Lake Michigan, Detroit, Grosse Isle, Mich.; Blue River, Ind.; Clear Lake, Ia.; "Togus Lake, Mt. Denver"?

Notropis hudsonius selene (Jordan). Pl. XVI, fig. 14.

Head $3\frac{7}{8}$ to $4\frac{1}{5}$; depth $3\frac{4}{5}$ to $4\frac{1}{5}$; D. iii, 7, 1; A. iii, 7, 1; scales usually about 37, often 38, seldom 36 + 2; 6 scales above l. l.; 5 scales below

⁵ L. c., 1856, p. 190. Arkansas River, near Fort Smith.

⁶ Rep. Expl. Sur. Pac. R.R., Zool. X, Fishes, 1858, p. 261, Pl. 58, figs. 1-4 (types).

l. l.; usually 15 predorsal scales, occasionally 14, 16 or 17; snout $3\frac{2}{3}$ to $3\frac{3}{4}$ in head; eye $3\frac{1}{10}$ to $3\frac{3}{4}$; maxillary 3 to $3\frac{3}{4}$; interorbital $2\frac{2}{3}$ to 3; teeth 2, 4-4, 2; length $3\frac{5}{16}$ to $4\frac{3}{8}$ inches. Ten examples from Sparrow Lake in Simcoe County, Ontario.

Originally this form was thought allied with *N. cornutus*, but its dark caudal spot, slightly imbricated lateral scales and fewer anal rays point to its present location. The original account⁷ differs in giving the depth $4\frac{1}{2}$, 4 scales above l. l. and 3 below. Dr. B. W. Evermann kindly examined examples from Garden Isle in Lake of the Woods and Rapid River, Minn. They show the head about $4\frac{1}{10}$ to $4\frac{1}{2}$, depth about $3\frac{9}{10}$ to $4\frac{3}{10}$, 5 scales above l. l., 4 scales below l. l., snout about 3 to $3\frac{1}{2}$, eye about 3 to $3\frac{1}{4}$, teeth (in 2 examples) 2, 4-4, 1, and length of largest about $3\frac{3}{4}$ inches. He writes "the only tangible difference, so far as these measurements show [from the typical *hudsonius*], is the length of the head, the *selene* type having a considerably shorter head than the others. There is no difference in the fins or scales." I have since examined several of these Lake of the Woods examples, now in the Academy, and think they are younger examples of *selene*, and that the size of the head is largely due to age.

Notropis hudsonius amarus (Girard). Pl. XVI, fig. 15.

Hybopsis phaëna Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 279. Trenton N. J.

Head $3\frac{3}{4}$ to $4\frac{3}{8}$; depth $3\frac{5}{8}$ to $4\frac{1}{5}$; D. iii, 7, 1; A. iii, 7, 1, rarely iii, 8, 1; scales usually 36, sometimes 38, seldom 34, rarely 37 or 39 + 2; scales usually 6 above l. l., occasionally 7; usually 5 scales below l. l., often 4; usually 15 predorsal scales, frequently 16, occasionally 14 or 18, seldom 17; snout $3\frac{1}{5}$? to $3\frac{3}{4}$ in head; eye $2\frac{1}{2}$ to $3\frac{2}{5}$; maxillary $2\frac{7}{8}$ to $3\frac{1}{2}$; interorbital $2\frac{1}{2}$ to 3; teeth usually 1, 4-4, 1, often 2, 4-4, 2, seldom 1, 4-4, 2, rarely 1, 4-5, 2 or 0, 4-4, 1; length $1\frac{13}{16}$ to $5\frac{5}{16}$ inches. Cotypes of *H. phaëna* 3 (type No. 4, 389, A. N. S. P.). Also 58 examples, from Trenton, Haddonfield, Ridgewood, Newbold's I., Borden-town, Duck I., N. J.; Baltimore, Charles County, Washington, Md.

Notropis hudsonius saludanus (Jordan and Brayton).

Head $3\frac{3}{4}$ to 4; depth $4\frac{1}{8}$ to 5; D. iii, 7, 1; A. iii, 7, 1, rarely iii, 6, 1; scales usually 36, sometimes 33, 34, 35 or 37 + 2; usually 6 scales above l. l., often 5; 4 scales below l. l.; usually 14 predorsal scales, occasionally 12; snout 3 to $3\frac{1}{2}$ in head; eye $2\frac{2}{5}$ to $3\frac{1}{8}$; maxillary $2\frac{7}{8}$ to $3\frac{1}{8}$; interorbital $2\frac{1}{2}$ to $3\frac{1}{5}$; teeth 1, 4-4, 1; length $2\frac{1}{2}$ to $3\frac{5}{8}$

⁷ *Luxilus selene* Jordan, Bull. U. S. Nat. Mus., No. 10, 1877, p. 60. Lake Superior, Bayfield, Wisconsin.

inches. Six examples from the Catawba River, N. C. Cope records these as *Hybopsis amarus*. Comparing his key, the head is given as 4, that of *N. hudsonius amarus* as $4\frac{1}{2}$, a character of no importance. He gives teeth for *saludanus* 1, 4-4, 1, and for *amarus* 2, 4-4, 2, stating that only the upper outer tooth is hooked and furnished with a grinding-surface and the others are obtuse. I find these characters to vary in most all degrees in both forms, except the number of teeth in the inner row, which seems to be constantly 1 in *saludanus*, though other material may show variation. Some of these latter show all the larger teeth hooked. I find it differs from *amarus* in the rather shorter thicker body, rather fewer predorsal scales, inner pharyngeal tooth either absent or only 1, and usually only upper tooth hooked and with grinding-surface as the others often obtuse, though this apparently a condition of age as in the smaller examples all have been found hooked.

Notropis formosus (Girard).

Moniana formosa Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 201. Rio Membres, Mex.

Head $3\frac{3}{4}$; depth $3\frac{1}{2}$; D. iii, 7, 1; A. iii, 7, 1; scales 44 + 2; 8 scales above l. l.; 5 scales below l. l.; 21 predorsal scales; snout $3\frac{1}{2}$ in head; eye $3\frac{1}{2}$; maxillary $2\frac{9}{16}$; interorbital $2\frac{2}{5}$; teeth hooked, grinding-surfaces moderate, 4-4; length $2\frac{1}{16}$ inches. Cotype of *M. formosa*.

Notropis frigidus (Girard).

Moniana frigida Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 200. Trib. Rio San Antonio and Rio Neuces.

Head $3\frac{2}{5}$ to $3\frac{1}{5}$; depth $2\frac{7}{8}$ to $3\frac{2}{5}$; D. iii, 7, 1; A. iii, 8, 1; scales 33 to 36 + 2 or 3; 7 scales above l. l.; 4 or 5 scales below l. l.; 16 predorsal scales; snout $3\frac{1}{8}$ to $3\frac{2}{5}$ in head; eye $3\frac{1}{5}$ to 4; maxillary $2\frac{1}{5}$ to $3\frac{2}{5}$; interorbital $2\frac{1}{4}$ to $2\frac{1}{5}$; teeth?—4, grinding-surfaces rather narrow; length $2\frac{1}{5}$ to $2\frac{2}{5}$ inches. Two cotypes? of *M. frigida*. Rio Salado (Clark?), Tex.? S. I. "2978." Very likely these are from the lot of 100 obtained in the Rio Salado, though no number is given by Girard.

Notropis lutrensis (Baird and Girard). Pl. XVI, fig. 16; Pl. XVII, figs. 17-21.

Cyprinella sawvis Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 197. Near San Antonio, Tex.

Moniana latabilis Girard, l. c., p. 200. Hurrah Creek, trib. Rio Grande.

M. pulchella Girard, l. c., p. 210. Sugar Loaf Creek, Tex.

M. rutila Girard, l. c., p. 210. Cadereita, Mex.

M. couchi Girard, l. c. Near China, New Leon, Mex.

M. gracilis Girard, l. c. Near Monterey, Mex.

Cyprinella billingsiana Cope, Rep. U. S. Geol. Sur., 1870 (1871), p. 439. St. Joseph, Mo.

Moniana jugalis Cope, l. c. St. Joseph, Mo.

Cliola montiregis Cope, Proc. Am. Philos. Soc. Phila., XXII, 1885, p. 168. Monterey, Mex.

Head $3\frac{1}{2}$ to 4; depth $2\frac{5}{8}$ to 4; D. iii, 7, 1, rarely iii, 8, 1; A. iii, 8, 1, seldom iii, 7, 1, rarely iii, 9, 1; scales usually 33, frequently 30 or 34, often 31 or 32, seldom 35, rarely 29 or 36 + usually 2, seldom 3, rarely 1; usually 6 scales above l. l., frequently 7, rarely 8; usually 4 scales below l. l., seldom 5; usually 14 predorsal scales, frequently 15, occasionally 13, often 16, seldom 17; snout $2\frac{1}{2}$ to 4 in head; eye $2\frac{3}{4}$ to 5; maxillary $2\frac{7}{8}$ to $3\frac{1}{2}$; interorbital $2\frac{1}{5}$ to 3; teeth usually 0, 4-4, 0, frequently 1, 4-4, 1, occasionally 1, 4-4, 0 or 0, 4-4, 1; length $1\frac{1}{8}$ to $2\frac{1}{2}$ inches. Cotypes, of *C. sauris* 2, *M. letabilis* 1, *M. pulchella* 1, *M. rutila* 1 (nearly desiccated), *M. couchi* 1 (labelled "Arkansas River near Fort Smith. Dr. George E. Shumard. Smiths. Inst. 2982" evidently erroneously), *M. gracilis* 1, *C. billingsiana* 40 (type No. 2,952, A. N. S. P.), *M. jugalis* 7 (type No. 3,144, A. N. S. P.), and type of *C. montiregis* (type No. 19,344, A. N. S. P.). Also 121 examples, from Chariton, Ia.; Clinton, Osage River, Brownsville, Sedalia, Marshfield, Greenfield, Mo.; Dallas, Palestine?, Devil's River, Del Rio, Graham, Wichita River, Tex.; Fort Riley, Kan.

Notropis proserpina (Girard). Pl. XVII, fig. 22.

Moniana proserpina Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 200.
Devil's River, Tex.

M. aurata Girard, l. c. Piedra Pointe, New Mex.

Head $3\frac{3}{5}$ to 4; depth 4 to $4\frac{2}{5}$; D. iii, 7, 1; A. iii, 7, 1; scales usually 34 or 35, sometimes 33 or 36 + usually 2, rarely 4; usually 6 scales above l. l., occasionally 7; 4 scales below l. l.; usually 16 predorsal scales, occasionally 15, 17 or 19; snout 3 to $3\frac{1}{2}$ in head; eye $3\frac{1}{2}$ to 4; maxillary $3\frac{1}{2}$ to $3\frac{4}{5}$; interorbital 3 to $3\frac{1}{5}$; teeth 4-4; length $2\frac{1}{8}$ to $2\frac{5}{8}$ inches. Cotypes of *M. proserpina* 1, and *M. aurata* 2. Also 52 examples from Del Rio, Tex.

Notropis bubalinus (Baird and Girard).

Cyprinella umbrosa Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 197.
Coal Creek, Canadian River, Ark.

C. beckwithi Girard, l. c. Arkansas River near Fort Makee.

Head $3\frac{4}{5}$; depth 3; D. iii, 7, 1; A. iii, 9, 1; scales 33 + 2; 7 scales above l. l.; 5 scales below l. l.; 16 predorsal scales; snout $3\frac{3}{4}$ in head; eye 4; maxillary 3; interorbital $2\frac{2}{5}$; teeth 1, 4-?, ?, hooked, grinding-surfaces, edges apparently crenulated. Cotype of *C. umbrosa*. Cotype of *C. beckwithi*, nearly dissolved.

Notropis ludibundus (Girard). Pl. XVII, fig. 23.

Cyprinella ludibunda Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 199.
No locality.

Cotype of *C. ludibunda*.

Notropis texanus (Girard).

Cyprinella texana Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 198. Rio Salado and Turkey Creek, Tex.

Head $3\frac{7}{8}$; depth $4\frac{1}{8}$; D. iii, 7, 1; A. iii, 7, 1; scales 36 + 2; 5 scales above 1. l.; 4 scales below 1. l.; about 15 predorsal scales; snout $3\frac{2}{3}$ in head; eye 3; maxillary $2\frac{7}{8}$; interorbital 3; teeth 4-4, grinding-surfaces narrow; length $1\frac{3}{8}$ inches (caudal damaged). Cotype of *C. texana*.

Notropis venustus (Girard).

Cyprinella venusta Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 198. Rio Sabinal, Tex.

Head $3\frac{7}{8}$ to 4; depth 3 to $4\frac{1}{4}$; D. iii, 7, 1, rarely iii, 6, 1; A. iii, 7, 1, rarely iii, 6, 1; scales usually 32, frequently 33, seldom 30, rarely 34 or 35 + usually 2, seldom 3; usually 6 scales above 1. l., often 7; usually 4 scales below 1. l., seldom 5; usually 15 predorsal scales, often 14 or 17; snout $3\frac{1}{10}$ to $3\frac{2}{3}$ in head; eye $3\frac{1}{3}$ to 4; maxillary 3 to $3\frac{2}{3}$; interorbital $2\frac{1}{4}$ to 3; teeth usually 1, 4-4, 1, rarely 0, 4-4, 1 or 1, 4?-4, 0; length $1\frac{3}{4}$ to $3\frac{1}{4}$ inches. Cotypes of *C. venusta* 2. Also 7 examples from Johnson's Fork of Llano River and the Rio Colorado at Austin, Tex.

Notropis stigmaturus (Jordan). Pl. XVII, fig. 24.

Photogenis stigmaturus Jordan, Ann. Lyc. N. Hist. N. Y., XI, 1876, p. 337. Trib. Etowah, Coosa and Oostanaula Rivers, Ga.

Head 4 to $4\frac{1}{2}$; depth 4 to 5; D. iii, 7, 1; A. iii, 7, 1, rarely iii, 8, 1; scales usually 40, sometimes 42, rarely 46 + usually 3, frequently 2; 7 scales above 1. l.; 5 scales below 1. l.; usually 19 predorsal scales, rarely 18, 20 or 22; snout $3\frac{1}{10}$ to $3\frac{2}{3}$ in head; eye $3\frac{1}{4}$ to 4; maxillary 3 to $3\frac{1}{2}$; interorbital $2\frac{2}{3}$ to $2\frac{7}{8}$; teeth usually 1, 4-4, 1, rarely 0, 4-4, 0; length $2\frac{7}{16}$ to $3\frac{3}{4}$? inches. Cotypes of *P. stigmaturus* 8, from the Etowah River.

Notropis callistius (Jordan). Pl. XVIII, fig. 25.

Photogenis callistius Jordan, Ann. Lyc. N. Hist. N. Y., XI, 1876, p. 337. Etowah and Oostanaula Rivers, Ga.

Head 4; depth $4\frac{1}{2}$; D. iii, 7, 1; A. iii, 8; scales 38 + 2; 6 scales above 1. l.; 4 scales below 1. l.; 17 predorsal scales; snout $3\frac{1}{3}$ in head; eye $3\frac{1}{4}$; maxillary $2\frac{3}{4}$; interorbital $2\frac{2}{3}$; teeth?, 4?-4?, 1?, grinding-surfaces entire; length $2\frac{3}{8}$ to $3\frac{1}{8}$ inches. Cotypes of *P. callistius* 3, from the Etowah, the largest figured. Said to differ from the preceding in red fin-pigment and more obscure dark caudal spot.

Notropis cæruleus (Jordan). Pl. XVIII, fig. 26.

Photogenis cæruleus Jordan, Ann. Lyc. N. Hist. N. Y., XI, 1876, p. 338.
Oostanaula River above Rome, Ga.

Head 4; depth 4 to $4\frac{1}{4}$; D. iii, 7, 1; A. iii, 7, 1 or iii, 8, 1; scales 34 or 35 + 2 or 3; 6 scales above l. l.; 4 scales below l. l.; 14 predorsal scales; snout $3\frac{1}{2}$ in head; eye $3\frac{1}{5}$ to $3\frac{1}{2}$; maxillary 3 to $3\frac{1}{5}$; interorbital $2\frac{2}{5}$ to $2\frac{1}{2}$; teeth 1, 4-4, 1 or 0, 4-4, 1; length $2\frac{3}{16}$ to 3 inches. Cotypes of *P. cæruleus* 3, medium sized example figured.

Notropis niveus (Cope). Pl. XVIII, fig. 27.

Hybopsis niveus Cope, Proc. Am. Philos. Soc. Phila., XI, 1869-70, p. 460.
Upper Catawba River, N. C.

Head $3\frac{1}{2}$ to 4; depth $3\frac{1}{5}$ to $4\frac{2}{5}$; D. iii, 7, 1; A. usually iii, 7, 1, sometimes iii, 8, 1, rarely iii, 6, 1; scales usually 34, often 32, 33 or 35 + usually 2, seldom 3; usually 6 scales above l. l., rarely 5; usually 4 scales below l. l., seldom 3; usually 15 predorsal scales, often 16, sometimes 14 or 17, rarely 18 or 19; snout 3 to $3\frac{2}{3}$ in head; eye $2\frac{2}{5}$ to 4; maxillary $2\frac{1}{5}$ to $3\frac{1}{5}$; interorbital $2\frac{2}{5}$ to 3; teeth usually 1, 4-4, 1, rarely 1, 4-4, 0; length $1\frac{11}{16}$ to $2\frac{1}{8}$ inches. Cotypes of *H. niveus* 19 (type No. 2,930, A. N. S. P.). Also 48 examples from Catawba, Neuse and Yadkin Rivers, N. C.

Notropis whipplii (Girard). Pl. XVIII, fig. 28.

Photogenis spilopterus Cope, Tr. Am. Philos. Soc. Phila., (2) XIII, 1865, p. 378. St. Josephs River, Mich.

Head $3\frac{1}{3}$ to $4\frac{1}{4}$; depth $3\frac{1}{5}$ to 5; D. iii, 7, 1; A. usually iii, 7, 1, sometimes iii, 8, 1, rarely iii, 5, 1 or iii, 6, 1; scales usually 33, frequently 34 or 35, often 36, sometimes 31 or 32, occasionally 30 or 38, seldom 29, rarely 26, 28 or 37 + usually 2, frequently 3; usually 6 scales above l. l., frequently 7; usually 4 scales below l. l., seldom 5; usually 16 predorsal scales, frequently 14 or 15, often 17, sometimes 18, occasionally 13, rarely 20; snout 3 to $3\frac{7}{8}$ in head; eye $2\frac{2}{3}$ to $4\frac{4}{5}$; maxillary $2\frac{2}{3}$ to $3\frac{1}{4}$; interorbital $2\frac{2}{7}$ to 3; teeth usually 1, 4-4, 1, rarely 0, 4-4, 1 or 1, 4-4, 0; length $1\frac{1}{2}$ to $3\frac{1}{8}$ inches. Cotype of *P. spilopterus*. Also 186 examples, from Ottumwa and Anamosa, Ia.; Carthage, Mo.; Wabash River, Ind.; Creek in Kanawha basin, Walker's Creek and Sinking Creek, Va.; Grosse Isle, Mich.

Notropis whipplii analostanus (Girard).

Head $3\frac{1}{3}$ to 4; depth $3\frac{1}{8}$ to $4\frac{3}{4}$; D. iii, 7, 1; A. usually iii, 8, 1, rarely iii, 7, 1; scales usually 34, frequently 35, often 32 or 33, sometimes 36, rarely 30 or 31 + usually 2, seldom 3; usually 6 scales above l. l., rarely 5 or 7; usually 4 scales below l. l., rarely 3 or 5; usually 15 predorsal scales, often 14 or 16, seldom 13, rarely 17;

snout $3\frac{1}{10}$ to $3\frac{1}{5}$ in head; eye $2\frac{3}{4}$ to $4\frac{1}{3}$; maxillary $2\frac{1}{5}$ to $3\frac{1}{2}$; interorbital $2\frac{1}{8}$ to 3; teeth usually 1, 4-4, 1, rarely 1, 4-4, 0; length $1\frac{3}{16}$ to 3 inches. Specimens 104, from Trenton, Duck, L., Newbold's L., Kinkora Creek, Trenton Junction, Burlington, Pensauken, Sewell, Mantua, N. J.; Stony Run in Cecil County, Gyn Oak in Baltimore County, Md.; James River and head of Roanoke River, Va.

Notropis galacturus (Cope).

Hypsilepis galacturus Cope, Proc. Acad. Nat. Sci. Phila., 1867, p. 160. Holston River, Va.

Head 3 to $4\frac{1}{4}$; depth $3\frac{7}{8}$ to 5; D. iii, 7, 1; A. usually iii, 8, 1, seldom iii, 7, 1 or iii, 9, 1; scales usually 30, frequently 29, often 31 or 32, sometimes 27 or 33, seldom 26, 34 or 36, rarely 24, 25, 28 or 38 + usually 3, rarely 4, seldom 2; usually 6 scales above l. l., sometimes 7; usually 4 scales below l. l., rarely 5; usually 15 or 16 predorsal scales, frequently 17, often 14, seldom 13, rarely 17 or 18; snout 3 to $3\frac{2}{3}$ in head; eye $3\frac{1}{4}$ to 5; maxillary $2\frac{7}{8}$ to $3\frac{9}{10}$; interorbital $2\frac{3}{4}$ to 3; teeth 1, 4-4, 1; length $2\frac{1}{2}$ to 5 inches. Cotypes of *H. galacturus* Cope 64 also 66 examples, from Catawba River and French Broad River, N. C.; S. Fork Cumberland River and Coal Creek, Tenn.; Eureka Springs, Ark.

Notropis pyrrhomelas (Cope). Pl. XVIII, fig. 29.

Photogenis pyrrhomelas Cope, Proc. Am. Philos. Soc. Phila., XI, 1870, p. 463. Upper Catawba River, N. C.

Head $3\frac{1}{2}$ to $3\frac{7}{8}$; depth $3\frac{2}{7}$ to $4\frac{1}{8}$; D. iii, 7, 1; A. usually iii, 9, 1, rarely iii, 8, 1 or iii, 10, 1; scales usually 30 or 33, seldom 32 or 34, rarely 28, 31 or 35 + usually 2, frequently 3; usually 6 scales above l. l., rarely 7; 4 scales below l. l.; usually 14 predorsal scales, often 13, seldom 15, rarely 12; snout $3\frac{1}{3}$ to $3\frac{3}{4}$ in head; eye 3 to $3\frac{1}{2}$; maxillary $2\frac{1}{2}$ to $2\frac{7}{8}$; interorbital $2\frac{3}{4}$ to $3\frac{1}{8}$; teeth usually 1, 4-4, 1, rarely 1, 5-4, 1; length $2\frac{1}{16}$ to $3\frac{7}{16}$ inches. Cotypes of *P. pyrrhomelas* 95 (type No. 2,631, A. N. S. P.). Cope says the teeth are without masticatory surface, which is not in agreement with my examination of his material, as they have well-developed grinding-surfaces. He further disagrees in stating ventrals reach the anal.

Notropis cornutus (Mitchill). Pl. XVII, fig. 30.

Plargyrus bowmani Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 196. Sweetwater, trib. of Platte.

Alburnops plumbeolus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 282. Flint, Mich.

Head $3\frac{3}{5}$ to $4\frac{1}{5}$; depth $2\frac{7}{8}$ to 5; D. iii, 7, 1, very rarely iii, 8, 1; A. usually iii, 8, 1, seldom iii, 9, 1, rarely iii, 7, 1; scales usually 34, frequently 32 or 35, often 33, sometimes 30, 31, 36, 37 or 38, occasionally

39, seldom 29 or 40, rarely 25, 27 or 28 + usually 3, frequently 2; usually 7 or 8 scales above l. l., seldom 6, rarely 9; usually 5 scales below l. l., occasionally 4, seldom 6, rarely 7; predorsal scales usually 17 or 19, frequently 15 or 18, often 16 or 20, sometimes 23, occasionally 14, 21 or 22, seldom 25, rarely 13, 24 or 26; snout $2\frac{1}{2}$ to 4 in head; eye $2\frac{1}{3}$ to 5; maxillary $2\frac{1}{2}$ to $3\frac{7}{8}$; interorbital $2\frac{2}{3}$ to $3\frac{1}{3}$; teeth 2, 4-4, 2; length $1\frac{1}{4}$ to 7 inches. "Type of *P. bowmani* Girard" (No. 3,236, A. N. S. P.) may not be Girard's type, as he shows an only example a little over 4 inches and mine measures only $2\frac{3}{8}$. Cotypes of *A. plumbeolus* 7 (type No. 2,055, A. N. S. P.). Also 332 examples, from Halifax, N. S.; Berkshire Hills, Mass.; Salamanca, N. Y.; Trenton, Oliphant's Mill, Pitman, Sewell, Mantua, N. J.; Stony Run, Gyn Oak Falls, Md.; head of James River, Holston River, Va.; Neuces River, N. C.; Coal Creek, Tenn.; Hicksville, O.; Miami River, Wabash River, Ind.; Pine Lake, Grosse Isle, Flint, Belle Isle, Mich.; Michigan City, Anamosa, Ia.; Marshfield, Sedalia, Carthage, St. Joseph River, Greenfield, Mo.; Lake Whittlesey, Minn.; Fort Riley, Kan.

Notropis cornutus cerasinus (Cope). Pl. XVIII, fig. 31.

Hypsilepis cornutus cerasinus Cope, Proc. Acad. Nat. Sci. Phila., 1867, p. 159. Head of Roanoke River.

Cotypes of *H. cornutus cerasinus* 42 (type No. 3,791, A. N. S. P.). Only the color given in Cope's account would point to the possibility of it being distinct. He says "it is entirely deep rose the inferior fins crimson." Jordan and Evermann state⁸ that it is never more than 4 inches long and yet the type, figured here, is 5. I cannot distinguish *Leuciscus frontalis* Agassiz and *L. gracilis* Agassiz, as a distinct subspecies of *N. cornutus*. His figure shows about 23? predorsal scales and 8 branched anal rays. Under *Hypsilepis frontalis* Cope distinguishes a number of Michigan examples. Later he notes others as *H. cornutus frontalis*, which I have partly examined, and find them to be within the variation of our common *cornutus*. The strikingly large predorsal scales would suggest a possible distinction were it not that other examples, from remote points in the range of the species, show this character equally well. All of the variations in structure are covered in *cornutus*.

Notropis cornutus cyaneus (Cope). Pl. XVIII, fig. 32.

Hypsilepis cornutus cyaneus Cope, Proc. Acad. Nat. Sci. Phila., 1867, p. 160. Montreal Run, Keeweenaw Point on Lake Superior.

Head $3\frac{3}{4}$ to $4\frac{1}{8}$; depth $3\frac{1}{2}$ to $4\frac{1}{3}$; D. iii, 7, 1; A. usually iii, 8, 1,

⁸ Bull. U. S. Nat. Mus., No. 47, I, 1896, p. 283.

seldom iii, 9, 1; scales usually about 31, sometimes 32, rarely 29, 33, 34 or 38 + usually 3, rarely 4; usually 9 scales above l. l., seldom 8; usually 5 scales below l. l., seldom 6; usually 28 predorsal scales seldom 30, rarely 25, 27, 29 or 32; snout $3\frac{1}{8}$ to $3\frac{1}{2}$ in head; eye $3\frac{2}{3}$ to $4\frac{2}{3}$; maxillary 3 to $3\frac{1}{4}$; interorbital 3 to $3\frac{1}{6}$; teeth 2, 4-4, 2; length $3\frac{1}{2}$ to 5 inches. Cotypes of *H. c. cyaneus* 10 (type No. 3,950, A. N. S. P.).

Notropis lacertosus (Cope). Pl. XIX, fig. 33.

Hybopsis lacertosus Cope, Journ. Acad. Nat. Sci. Phila., (2) VI, 1868, p. 232. Bear Creek, Va.

Head $3\frac{2}{3}$ to 4; depth $4\frac{1}{3}$ to $4\frac{3}{4}$; D. iii, 7, 1; A. usually iii, 8, 1, rarely iii, 7, 1 or iii, 9, 1; scales usually 39 or 40, sometimes 36 or 38 + usually 2, seldom 3; usually 7 scales above l. l., seldom 6, rarely 8?; 4 scales below l. l.; usually 17 predorsal scales, seldom 16 or 18; snout $3\frac{1}{10}$ to $3\frac{1}{3}$ in head; eye $2\frac{1}{5}$ to $3\frac{1}{3}$; maxillary $2\frac{1}{4}$ to $2\frac{1}{2}$; interorbital $2\frac{1}{2}$ to $3\frac{1}{6}$; teeth 2, 4-4, 2; length $1\frac{7}{8}$ to $4\frac{3}{8}$ inches. Cotypes of *H. lacertosus* 5 (type No. 2,835, A. N. S. P. figured) all in poor preservation. Also 6 examples from the Holston River, Va. The accompanying figure of the type is largely restored.

Notropis coccogenis (Cope).

Hypsilepis coccogenis Cope, Proc. Acad. Nat. Sci. Phila., 1867, p. 160. Holston River, Va.

Head $3\frac{1}{2}$ to $4\frac{1}{10}$; depth $3\frac{3}{4}$ to 5; D. iii, 7, 1, rarely iii, 8, 1, abnormally iii, 5, 1; A. usually iii, 8, 1, frequently iii, 7, 1 or iii, 9, 1, rarely iii, 10, 1; scales usually 34, often 41, sometimes 36 or 40, occasionally 33, 35, 38 or 39, seldom 30 or 32, rarely 31 or 37 + usually 3, sometimes 2, occasionally 4; usually 7 scales above l. l., seldom 6; usually 5 scales below l. l., seldom 4; usually 17 predorsal scales, frequently 16, often 15, 18 or 19, occasionally 14, seldom 20, rarely 13; snout $3\frac{1}{10}$ to $3\frac{3}{4}$ in head; eye $2\frac{2}{3}$ to 4; maxillary $2\frac{1}{4}$ to $2\frac{1}{2}$; interorbital $2\frac{1}{3}$ to $3\frac{2}{5}$; teeth usually 2, 4-4, 2, rarely 1, 4-4, 2; length $2\frac{1}{16}$ to 5 inches. Cotypes of *H. coccogenis* Cope 100 (type No. 3,561, A. N. S. P.). Also 42 examples, from Holston River and S. Fork, Va.; French Broad River and "Neuce River," N. C.; Coal Creek, Tenn.

Notropis zonatus (Putnam).

Head $3\frac{1}{2}$ to $4\frac{1}{4}$; depth $3\frac{2}{3}$ to $5\frac{1}{4}$; D. iii, 7, 1; A. usually iii, 8, 1, frequently iii, 7, 1, sometimes iii, 9, 1, seldom iii, 10, 1, rarely iii, 6, 1; scales usually 34, frequently 38, often 33 or 40, occasionally 32, 35, 37 or 39, rarely 31, 36 or 41 + usually 3, seldom 2; usually 6 scales above l. l., sometimes 7, seldom 5, rarely 4; usually 4 or 5 scales below l. l., seldom 3 or 6; usually 13 predorsal scales, frequently 15, often 14 or 16, sometimes 17; snout $3\frac{2}{7}$ to $3\frac{3}{4}$ in head; eye $2\frac{1}{2}$ to

$3\frac{2}{3}$; maxillary $2\frac{2}{5}$ to $3\frac{1}{4}$; interorbital $2\frac{1}{3}$ to $3\frac{2}{3}$; teeth usually 2, 4-4, 2, seldom 1, 4-4, 2, rarely 0, 3-4, 1 or 1?, 4-4, 1 or 0, 4-4, 2 or 2, 3?-4, 0? or 1, 3-4, 2; length $1\frac{2}{16}$ to 4 inches. Eighty examples, from Eureka Springs and White River, Ark.; Marshfield, Greenfield, Carthage and James River, Mo.

Notropis rubricroceus (Cope). Pl. XIX, fig. 34.

Hybopsis rubricroceus Cope, Journ. Acad. Nat. Sci. Phila., (2) VI, 1868, p. 231, Pl. 24, fig. 4. Tumbling Creek, N. Fork Holston River, Va.

Head $3\frac{2}{5}$ to 4; depth 4 to $4\frac{3}{4}$; D. iii, 7, 1; A. usually iii, 7, 1, rarely iii, 8, 1; scales usually 35, often 32, 34, 35 or 39, seldom $37 + 2$ or 3; usually 6 scales above l. l., occasionally 7; usually 4 scales below l. l., rarely 3; predorsal scales 13 to 17, rarely 18; snout $3\frac{1}{3}$ to $3\frac{2}{3}$ in head; eye $2\frac{7}{8}$ to $3\frac{3}{5}$; maxillary $2\frac{1}{3}$ to 3; interorbital $2\frac{2}{3}$ to $3\frac{1}{4}$; teeth 2, 4-4, 2; length $1\frac{1}{2}$? to $2\frac{9}{16}$ inches. Cotypes of *H. rubricroceus* 14 (type No. 2,907, A. N. S. P.).

Notropis chlorocephalus (Cope). Pl. XIX, fig. 35.

Hybopsis chlorocephalus Cope, Proc. Am. Philos. Soc. Phila., XI, 1870, p. 461. Trib. Catawba River, N. C.

Head $3\frac{1}{4}$ to $3\frac{7}{8}$; depth $4\frac{1}{4}$ to 5; D. iii, 7, 1; A. iii, 7, 1; scales usually 32, 33 or 37, sometimes 30?, 31?, 35 or $36 +$ usually 3, rarely 2; 6 scales above l. l.; 4 scales below l. l.; predorsal scales usually 16, often 15, sometimes 10 to 14, 17, 19 or 20; snout $3\frac{1}{3}$ to $3\frac{2}{5}$ in head; eye $2\frac{3}{4}$ to 3; maxillary $2\frac{2}{5}$ to $3\frac{2}{7}$; interorbital $2\frac{1}{2}$ to $3\frac{1}{5}$; teeth usually 1, 4-4, 1, rarely 1?, 3-4, 1 or 1, 4-4, 0; length $1\frac{7}{16}$ to $2\frac{1}{8}$ inches. Cotypes of *H. chlorocephalus* 41 (type No. 2,755, A. N. S. P.).

Notropis chiliticus (Cope). Pl. XIX, fig. 36.

Hybopsis chiliticus Cope, Proc. Am. Philos. Soc. Phila., XI, 1870, p. 462. Yadkin River, N. C.

Head $3\frac{2}{3}$ to $3\frac{1}{3}$; depth $4\frac{1}{4}$ to $4\frac{3}{4}$; D. iii, 7, 1; A. iii, 7, 1; scales usually 36, seldom 35? or $38 +$ usually 2, sometimes 3; 7 scales above l. l.; usually 4 scales below l. l., seldom 3; usually 15 or 16 predorsal scales, seldom 17; snout $3\frac{1}{3}$ to $3\frac{2}{5}$ in head; eye $2\frac{4}{5}$ to $3\frac{1}{5}$; maxillary $2\frac{3}{4}$ to 3; interorbital $2\frac{3}{4}$ to $3\frac{1}{5}$; teeth 2, 4-4, 2; length $1\frac{9}{16}$ to $2\frac{1}{4}$ inches. Cotypes of *H. chiliticus* Cope 11 (type No. 4,378, A. N. S. P.).

Notropis altipinnis (Cope). Pl. XIX, fig. 37.

Alburnellus altipinnis Cope, Proc. Am. Philos. Soc. Phila., XI, 1870, p. 464. Yadkin River, Roane County, N. C.

Head 4; depth $5\frac{1}{5}$; D. iii, 7, 1; A. iii, 8, 1; scales $32 + 2$; 6 scales above l. l.; 4 scales below l. l.; 16 predorsal scales; snout $3\frac{1}{3}$ in head; eye $2\frac{3}{5}$; maxillary $3\frac{1}{10}$; interorbital 3; teeth 2, 4-4, 2; length $2\frac{1}{16}$ to $2\frac{1}{8}$

inches. Cotypes of *A. altipinnis* 3 (type No. 2,846, A. N. S. P.). One example in poor preservation.

Notropis roseus (Jordan). Pl. XIX, fig. 38.

One from Taylor's Creek, northeast trib. Lake Okeechobe (Heilprin), Fla.

Notropis chalybæus (Cope). Pl. XIX, fig. 39.

Head $3\frac{1}{2}$ to 4; depth $3\frac{7}{8}$ to $4\frac{1}{5}$; D. iii, 7, 1; A. usually iii, 7, 1, rarely iii, 8, 1; scales usually 31, often 30 or 28, seldom 29 or 33 + usually 3, sometimes 2; usually 6 scales above l. l., sometimes 7; usually 4 scales below l. l., rarely 3; usually 15 predorsal scales, sometimes 16 or 17, seldom 13, 14 or 18; snout $3\frac{1}{10}$ to 4 in head; eye $2\frac{1}{3}$ to 3; maxillary 3 to $3\frac{2}{7}$; interorbital $2\frac{1}{4}$ to 3; teeth 2, 4-4, 2; length 1 to $1\frac{7}{8}$ inches. Very many examples, of which 52 were examined from Pensauken, Turnersville and Kinkora, N. J. Example figured from Bristol, Pa.

Notropis chalybæus abbotti Fowler. Pl. XIX, fig. 40.

Proc. Acad. Nat. Sci. Phila., 1904, p. 339, Pl. 17, upper fig. Batsto River, N. J.

Head $3\frac{3}{4}$ to 4; depth $3\frac{1}{3}$ to $4\frac{1}{5}$; D. iii, 7, 1; A. usually iii, 7, 1, rarely iii, 8, 1; scales usually 29, 30 or 31, sometimes 26 or 34, seldom 27, 32 or 36 + usually 2, often 3, rarely 1; 6 or 7 scales above l. l.; usually 4 scales below l. l., rarely 3; usually 15 predorsal scales, frequently 16, often 17, sometimes 18, seldom 14; snout $3\frac{1}{4}$ to 4 in head; eye $2\frac{1}{3}$ to 3; maxillary 3 to $3\frac{1}{2}$; interorbital $2\frac{1}{4}$ to $2\frac{7}{8}$; teeth 2, 4-4, 2; length $1\frac{5}{16}$ to $2\frac{5}{16}$ inches. Type and paratypes of *N. c. abbotti* 19. Also very large series of examples, of which 425 examined, from Brown's Mills, Mare Run, New Lisbon, Porchtown, Oliphant's Mill and Newton's Bridge, N. J.

Notropis chrosomus (Jordan). Pl. XX, fig. 41.

Hybopsis chrosomus Jordan, Ann. Lyc. N. Hist. N. Y., XI, 1876, p. 333. Etowah, Oostanaula and Coosa Rivers, Ga.

Head $3\frac{7}{8}$ to 4; depth $4\frac{1}{2}$ to 5; D. iii, 7, 1; A. iii, 9, 1; scales 38 or 39 + 2; 7 scales above l. l.; 4 scales below l. l.; 20 or 23 predorsal scales; snout $3\frac{1}{3}$ in head; eye $2\frac{4}{5}$ to $2\frac{5}{8}$; maxillary $2\frac{4}{5}$ to $2\frac{7}{8}$; interorbital $2\frac{4}{5}$; teeth 2, 4-4, 2; length $1\frac{3}{8}$ to $1\frac{7}{8}$ inches. Cotypes of *H. chrosomus* 3, from the Etowah River.

Notropis xænocephalus (Jordan). Pl. XX, fig. 42.

Hybopsis xænocephalus Jordan, Ann. Lyc. N. Hist. N. Y., XI, 1876, p. 334. Etowah, Oostanaula and Coosa Rivers, Ga.

Head $3\frac{7}{8}$ to $4\frac{1}{5}$; depth $4\frac{1}{3}$ to 5; D. iii, 7, 1; A. usually iii, 7, 1, seldom iii, 6, 1; scales usually 29, sometimes 28, 31, 32 or 33 + usually

2, often 1; 5 scales above 1. l.; usually 4 scales below 1. l., rarely 5; usually 12, 13 or 15 predorsal scales, sometimes 14; snout $3\frac{1}{8}$ to $3\frac{3}{7}$ in head; eye $2\frac{1}{5}$ to $3\frac{2}{5}$; maxillary $2\frac{1}{5}$ to $3\frac{1}{3}$; interorbital $2\frac{2}{3}$ to 3; teeth 2, 4-4, 2; length 2 to $2\frac{1}{8}$ inches. Cotypes of *H. xenocephalus* 9, from the Etowah River.

Notropis ariommus (Cope). Pl. XX, fig. 43.

Photogenis ariommus Cope, Tr. Am. Philos. Soc. Phila., (2) VI, 1869, p. 378. No locality given (White River Indianapolis, Ind.)

Type of *P. ariommus*.

Notropis scabriceps (Cope).

Photogenis scabriceps Cope, Proc. Acad. Nat. Sci. Phila., 1867, p. 166. Sinking Creek, Walker's Creek and near Austinville, Va.

Head $3\frac{1}{4}$ to 4; depth 4 to $5\frac{2}{5}$; D. iii, 7, 1; A. usually iii, 7, 1, seldom iii, 8, 1; scales usually 32, often 33 or 34, seldom 30 or 31, rarely 36 + usually 2, sometimes 3; usually 6 scales above 1. l., rarely 5; 4 scales below 1. l.; usually 14 predorsal scales, often 13 or 15, seldom 12, rarely 17; snout $3\frac{1}{8}$ to $3\frac{1}{4}$ in head; eye $2\frac{1}{4}$ to $3\frac{1}{4}$; maxillary $2\frac{3}{4}$ to $3\frac{1}{2}$; interorbital $2\frac{2}{3}$ to 4; teeth 2, 4-4, 2; length $1\frac{1}{8}$ to $2\frac{1}{8}$ inches. Cotypes of *P. scabriceps* 33 (type No. 7,588, A. N. S. P., from Sinking Creek).

Notropis swaini Jordan. Pl. XX, fig. 44.

Proc. U. S. Nat. Mus., 1885, p. 123. (Based on cotype of *Alburnus megalops* Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 193. San Felipe Creek, Tex. Name preoccupied in *Notropis*.)

Cotype of *A. megalops* and thus of *N. swaini*.

Notropis amabilis (Girard).

Alburnus amabilis Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 193. Rio Leona, affluent of Rio Nueces, Tex.

Head $3\frac{1}{2}$; depth $4\frac{1}{5}$; D. iii, 7, 1; A. iii, 8, 1; scales 33 + 2; 5 scales above 1. l.; 4 scales below 1. l.; 16 predorsal scales; snout $3\frac{1}{2}$ in head; eye 3; maxillary $2\frac{3}{4}$; interorbital $2\frac{1}{2}$; length $2\frac{1}{4}$ inches. Cotype of *A. amabilis*.

Notropis luciodus (Cope) Pl. XX, fig. 45.

Photogenis luciodus Cope, Proc. Acad. Nat. Sci. Phila., 1867, pp. 164, 165. Trib. of Holston River, Va.

Head $3\frac{3}{4}$ to $4\frac{1}{2}$; depth 4 to $5\frac{3}{4}$; D. iii, 7, 1; A. usually iii, 7, 1, occasionally iii, 8, 1, rarely iii, 6, 1; scales usually 36, frequently 35, often 38, seldom 37 or 39, rarely 40; usually 6 scales above 1. l., seldom 5; 4 scales below 1. l.; usually 15 predorsal scales, frequently 14, often 16, seldom 13, rarely 17; snout 3 to $3\frac{1}{4}$ in head; eye $2\frac{3}{4}$ to $3\frac{1}{2}$; maxillary $2\frac{2}{3}$ to $3\frac{2}{3}$; interorbital $2\frac{2}{5}$ to $3\frac{1}{5}$; teeth 1, 4-4, 1; length $1\frac{3}{4}$ to $3\frac{3}{8}$ inches. Cotypes of *P. luciodus* 23 (type No. 2,336, A. N. S. P.). Also 45 examples, from French Broad River, N. C.; Cumberland River, Tenn.; Holston River, Va.

Notropis telescopus (Cope).

Photogenis telescopus Cope, Proc. Acad. Nat. Sci. Phila., 1867, p. 165. Holston River, Va.

Head $3\frac{3}{4}$ to $4\frac{1}{3}$; depth $4\frac{1}{8}$ to $5\frac{3}{4}$; D. iii, 7, 1; A. usually iii, 9, 1, sometimes iii, 10, 1, occasionally iii, 8, 1, very rarely iii, 11, 1; scales usually 33, frequently 35, often 34, sometimes 36, occasionally 32 or 37, rarely 31, 38 or 39 + usually 2, frequently 3; usually 5 scales above l. l., often 6, rarely 7; usually 4 scales below l. l., sometimes 3; usually 14 predorsal scales, frequently 13, often 15, rarely 16 or 17; snout $3\frac{1}{8}$ to 4 in head; eye $2\frac{1}{4}$ to 3; maxillary $2\frac{3}{8}$ to $3\frac{1}{8}$; interorbital $2\frac{7}{8}$ to $3\frac{1}{8}$; teeth 2, 4-4, 2; length $1\frac{1}{16}$ to $3\frac{3}{8}$ inches. Cotypes of *P. telescopus* 104 (type No. 2,157, A. N. S. P.). Also 167 examples, from Holston River, Va.; French Broad River and Henderson County, N. C.; Cumberland River and Coal Creek, Tenn.

Notropis socius (Girard).

Alburnus socius Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 193. Live Oak Creek, Tex.

Head $3\frac{1}{3}$ to $3\frac{4}{5}$; depth $3\frac{3}{4}$ to 5; D. iii, 7, 1; A. usually iii, 9, 1, often iii, 8, 1, seldom iii, 7, 1 or iii, 10, 1; scales usually 34, sometimes 36 or 37, occasionally 32, 33 or 35 + usually 2, seldom 3; usually 6 scales above l. l., rarely 5 or 7; usually 4 scales below l. l., seldom 3; usually 15 predorsal scales, often 13 or 16, sometimes 14 or 18, seldom 17; snout $3\frac{1}{3}$ to 4 in head; eye $2\frac{3}{7}$ to $3\frac{1}{2}$; maxillary $2\frac{1}{4}$ to 3; interorbital $2\frac{7}{8}$ to $3\frac{1}{3}$; teeth 2, 4-4, 2; length $1\frac{1}{16}$ to $2\frac{3}{8}$ inches. Cotype of *A. socius*. Also 54 examples, from Del Rio and Wichita River, Tex.

Notropis notemigonoides Evermann.

Head $3\frac{7}{8}$ to $4\frac{1}{5}$; depth $3\frac{3}{8}$ to $4\frac{1}{2}$; D. usually iii, 7, 1, rarely iii, 6, 1; A. usually iii, 9, 1 or iii, 10, 1, sometimes iii, 11, 1; scales usually 39 to 41, sometimes 36, 37 or 38 + usually 2, rarely 3; usually 8 scales above l. l., rarely 7 or 9; usually 4 scales below l. l., seldom 5; predorsal scales sometimes 22, 26 or 27, seldom 23, 24 or 29; snout 3 to $3\frac{2}{5}$ in head; eye 3 to $3\frac{2}{5}$; maxillary $2\frac{3}{5}$ to 3; interorbital $2\frac{2}{7}$ to 3; teeth 2, 4-4, 2; length $1\frac{3}{4}$ to $2\frac{9}{16}$ inches. Nine examples from Hartford, Ark., and Beaumont, Tex.

Notropis stilbius (Jordan). Pl. XX, fig. 46.

Nototropis stilbius Jordan, Ann. Lyc. N. Hist. N. Y., XI, 1876, p. 343. Etowah River basin, Ga.

Head $3\frac{1}{2}$; depth $4\frac{1}{2}$; D. iii, 7, 1; A. iii, 10, 1; scales 33 + 3; 5 scales above l. l.; 3 scales below l. l.; 17 predorsal scales; snout $3\frac{1}{4}$ in head; eye $2\frac{7}{8}$; maxillary $2\frac{2}{5}$; interorbital $3\frac{1}{4}$; teeth 2, 4-4, 2; length $2\frac{1}{2}$ inches. Cotypes of *N. stilbius* 2, larger figured.

Notropis atherinoides Rafinesque. Pl. XX, fig. 47.

Alburnellus jaculus Cope, Tr. Am. Philos. Soc. Phila., (2) XIII, 1866, p. 387. St. Josephs River, Mich.

Head $3\frac{1}{2}$ to $4\frac{1}{2}$; depth $4\frac{1}{2}$ to 6; D. usually iii, 7, 1, rarely iii, 6, 1; A. usually iii, 9, 1, frequently iii, 10, 1, seldom iii, 11, 1; scales usually 36, frequently 37, often 34, sometimes 38 or 39, occasionally 32 or 33, rarely 35 or 40 + usually 2, often 3; usually 6 scales above l. l., often 7; usually 4 scales below l. l., sometimes 3, seldom 5; usually 20 predorsal scales, frequently 19, often 16, sometimes 17, 18 or 21, seldom 15, 22 or 23, rarely 24; snout $3\frac{1}{2}$ to $3\frac{3}{4}$ in head; eye $2\frac{1}{2}$ to $3\frac{1}{4}$; maxillary $2\frac{1}{2}$ to $3\frac{2}{3}$; interorbital $2\frac{1}{2}$ to $3\frac{2}{3}$; teeth usually 2, 4-4, 2, rarely 2, 4-4, 1; length $1\frac{3}{4}$ to 4 inches. Cotype of *A. jaculus*. Also 135 examples, from Lake Winnetonka, Minn.; Joliet, Ill.; Blue River and Wabash River, Ind.; Sinking Creek, Walker's Creek, and head of James and Roanoke Rivers, Va.; "Togus Lake near Denver, Col."

Notropis dilectus (Girard). Pl. XX, fig. 48.

Alburnus oligaspis Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 282. Kansas.

Head $3\frac{5}{7}$ to 4; depth $3\frac{1}{3}$ to $5\frac{1}{7}$; D. iii, 7, 1; A. usually iii, 9, 1, seldom iii, 8, 1, rarely iii, 10, 1; scales often 33, 37 to 39, sometimes 31, 32, 34, 35 or 40 + usually 2, seldom 3; usually 7 scales above l. l., seldom 6, rarely 8; 4 scales below l. l.; usually 17 or 19 predorsal scales, seldom 18 or 21; snout $3\frac{1}{4}$ to $3\frac{7}{8}$ in head; eye 3 to $3\frac{1}{3}$; maxillary $2\frac{1}{2}$ to $3\frac{1}{2}$; interorbital $2\frac{5}{8}$ to $3\frac{1}{2}$; teeth 2, 4-4, 2; length $1\frac{3}{8}$ to $2\frac{7}{8}$ inches. Cotypes of *A. oligaspis* 2 (type No. 2,753, A. N. S. P.). Also 14 examples, from Chester, Ia. and Greenfield, Mo.

Notropis rubrifrons (Cope). Pl. XXI, figs. 49-50.

Alburnus rubrifrons Cope, Proc. Acad. Nat. Sci. Phila., 1865, p. 85. Kiskiminitas River, Pa.

Alburnellus percobromus Cope, Rep. U. S. Geol. Sur. Wyom. Hayden, 1870, p. 440. St. Joseph, Mo.

Head $3\frac{2}{5}$ to $3\frac{7}{8}$; depth $3\frac{3}{4}$ to $5\frac{1}{3}$; D. iii, 7, 1; A. usually iii, 9, 1, often iii, 10, 1, seldom iii, 8, 1; scales usually 34, often 33 or 35, sometimes 30 or 32, rarely 31, 36, 37 or 39 + usually 2, often 3; usually 6 scales above l. l., sometimes 7; usually 4 scales below l. l., rarely 3; usually 18 predorsal scales, often 17, sometimes 15 or 19, seldom 16; snout $3\frac{1}{8}$ to $3\frac{1}{2}$ in head; eye $2\frac{7}{8}$ to $3\frac{1}{2}$; maxillary $2\frac{1}{4}$ to $2\frac{7}{8}$; interorbital $2\frac{3}{4}$ to $3\frac{1}{2}$; teeth 2, 4-4, 2; length $1\frac{1}{16}$ to $2\frac{3}{8}$ inches. Cotypes of *A. rubrifrons* 5 and *A. percobromus* 17 (type No. 2,993, A. N. S. P.). Also 7 examples, from Carthage, Mo.; Graham, Tex.; Kanawha River, Va.

Notropis photogenis (Cope). Pl. XXI, figs. 51-52.

Squalius photogenis Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 280. Youghioghenvy River, Pa.

Photogenis leucops Cope, l. c., 1867, p. 164. Sinking Creek and near Austinville, Va.

P. leucops engraulinus Cope, l. c. Kanawha River, Austinville, Va.

Head $3\frac{1}{3}$ to $4\frac{1}{3}$; depth $4\frac{2}{5}$ to 6 ($6\frac{2}{5}$?); D. iii, 7, 1; A. usually iii, 9, 1, sometimes iii, 8, 1 or iii, 10, 1, rarely iii, 7, 1 or iii, 11, 1; scales often 33, sometimes 35 or 37, seldom 36 or 38, rarely 30, 31, 34 or 40 + usually 2, often 3; usually 6 scales above l. l., seldom 7, rarely 5; 4 scales below l. l.; usually 17 predorsal scales, often 15, 16 or 18, seldom 19, rarely 13 or 14; snout 3 to $3\frac{1}{5}$ in head; eye $2\frac{1}{2}$ to $3\frac{1}{2}$; maxillary $2\frac{1}{4}$ to $3\frac{1}{8}$; interorbital $2\frac{1}{3}$ to $3\frac{3}{4}$; teeth 2, 4-4, 2; length $1\frac{1}{8}$ to 4 inches. Cotypes of *P. leucops* (type No. 2,581, A. N. S. P.) and *S. photogenis* 2, and type of *P. l. engraulinus*, the latter in poor preservation.

Notropis photogenis amœnus (Abbott). Pl. XXI, fig. 53.

One from Stony Run, Cecil County, Md.

Notropis micropteryx (Cope). Pl. XXI, fig. 54.

Alburnellus micropteryx Cope, Journ. Acad. Nat. Sci. Phila., (2) VI, 1869, p. 233. Holston River, Va.

Head 4 to $4\frac{1}{4}$; depth 5 to $5\frac{1}{2}$; D. iii, 7, 1; A. iii, 7, 1 usually, iii, 8, 1 rarely; usually 35 scales, sometimes 34, 36 or 37 + usually 3, often 2; 5 scales above l. l.; 3 scales below l. l.; usually 17 predorsal scales, sometimes 15, 18 or 19; snout $3\frac{2}{7}$ to $3\frac{1}{2}$ in head; eye $2\frac{3}{4}$ to $3\frac{1}{3}$; maxillary $2\frac{1}{2}$ to $2\frac{5}{8}$; interorbital $2\frac{7}{8}$ to $3\frac{1}{3}$; teeth 2, 4-4, 2; length $2\frac{1}{8}$ to $2\frac{6}{16}$ inches. Cotypes of *A. micropteryx* 2 (type No. 2,842, A. N. S. P.). Also 5 examples, from Eureka Springs, Ark. and Coal Creek, Tenn.

Notropis lirus (Jordan). Pl. XXI, fig. 55.

Nototropis lirus Jordan, Ann. Lyc. N. Hist. N. Y., 1876, p. 342. Etowah River, Rome, Ga.

Cotype of *N. lirus*.

Notropis umbratilis (Girard).

Luxilus lucidus Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 203. Coal Creek, trib. S, Fork Canadian River, Ark.

Head $3\frac{3}{4}$ to 4; depth $3\frac{2}{5}$ to $4\frac{1}{2}$; D. iii, 7, 1; A. usually iii, 9, 1, seldom iii, 10, 1; scales often 39, sometimes 35, seldom 33, 36 or 41 + usually 3, seldom 2; usually 9 scales above l. l., often 10, rarely 11; usually 4 scales below l. l., seldom 5; often 23 to 25 predorsal scales, seldom 20, 22, 26 or 27; snout $3\frac{1}{5}$ to $3\frac{1}{2}$ in head; eye 3 to $3\frac{1}{2}$; maxillary $2\frac{1}{2}$ to 3; interorbital $2\frac{3}{4}$ to 3; teeth 2, 4-4, 2;

length $1\frac{3}{8}$ to $2\frac{5}{8}$ inches. Cotype of *L. lucidus* 2. Also 10 examples, from Marshfield and Sedalia, Mo.

Notropis umbratilis lythrurus (Jordan).

Head $3\frac{7}{8}$ to $4\frac{1}{2}$; depth $3\frac{1}{4}$ to $4\frac{1}{4}$; D. iii, 7, 1; A. iii, 10, 1; scales often 37, sometimes 35, 39 or 41 + usually 2, rarely 3; usually 10 scales above l. l., sometimes 9; 5 scales below l. l.; often 26 or 22 predorsal scales, seldom 23; snout $3\frac{1}{10}$ to $3\frac{1}{4}$; eye $3\frac{1}{10}$ to $3\frac{3}{4}$; maxillary $2\frac{1}{2}$ to 3; interorbital $2\frac{2}{3}$ to 3; teeth 2, 4-4, 2; length $2\frac{5}{16}$ to $2\frac{3}{4}$ inches. Seven examples from Indiana, and Lansing, Mich., the latter recorded as *Hypsilepis diplamia* Cope.⁹

Notropis umbratilis ardens (Cope). Pl. XXI, fig. 56.

Hypsilepis ardens Cope, Proc. Acad. Nat. Sci. Phila., 1867, p. 163. Head of Roanoke River, Va.

Head 4 to $4\frac{1}{4}$; depth $4\frac{1}{2}$ to $5\frac{3}{4}$; D. iii, 7, 1; A. usually iii, 9, 1, often iii, 10, 1, occasionally iii, 8, 1, seldom iii, 7, 1 or iii, 11, 1, rarely iii, 12, 1; scales often 40 to 42, seldom 35 or 39 + usually 2 or 3, rarely 4; usually 8 scales above l. l., seldom 7, rarely 9; usually 4 scales below l. l., rarely 5; often 24, 26 or 27 predorsal scales, sometimes 22, 23 or 25; snout $3\frac{1}{10}$ to $3\frac{1}{2}$ in head; eye 3 to $3\frac{3}{4}$; maxillary $2\frac{3}{7}$ to $2\frac{7}{8}$; interorbital 3 to $3\frac{1}{2}$; teeth 2, 4-4, 2; length $2\frac{1}{2}$ to $3\frac{1}{8}$ inches. Cotypes of *H. ardens* 48 (type No. 3,268, A. N. S. P.). Also 176 examples from S. Fork of Cumberland River, Tenn.

EXPLANATION OF PLATES XV-XXI.

PLATE XV—Fig. 1—*Notropis bifrenatus* (Cope). Example from Holmesburg, Phila., Pa.

Fig. 2—*N. cayuga* Meek. Example from Silver Lake, Ia.

Fig. 3—*N. fretensis* (Cope). Type of *Hybopsis fretensis* Cope.

Fig. 4—*N. deliciosus* (Girard). Cotype of *Moniana deliciosa* Girard.

Fig. 5—*N. deliciosus* (Girard). Type of *Hybognathus stramineus* Cope.

Fig. 6—*N. deliciosus* (Girard). Type of *Hybopsis missuriensis* Cope.

Fig. 7—*N. volucellus* (Cope). Example from Hicksville, O.

Fig. 8—*N. procne* (Cope). Cotype of *Hybognathus procne* Cope.

PLATE XVI—Fig. 9—*N. procne longiceps* (Cope). Type of *Hybopsis longiceps* Cope.

Fig. 10—*N. blennius* (Girard). Cotype of *Alburnops blennius* Girard.

Fig. 11—*N. illecebrosus* (Girard). Cotype of *Alburnops illecebrosus* Girard.

Fig. 12—*N. gilberti* Jordan and Meek. Cotype.

Fig. 13—*N. boops* Gilbert. Example from Blue River, Ind.

Fig. 14—*N. hudsonius selene* (Jordan). Example from Sparrow Lake, Ont.

Fig. 15—*N. h. amarus* (Girard). Type of *Hybopsis phaëna* Cope.

Fig. 16—*N. lutrensis* (Baird and Girard). Cotype of *Cyprinella sauris* Girard.

⁹ Proc. Acad. Nat. Sci. Phila., 1864, p. 279, and l. c., 1867, p. 162.

PLATE XVII—Fig. 17—*N. lutrensis* (Baird and Girard). Cotype of *Moniana latabilis* Girard.

Fig. 18—*N. lutrensis* (Baird and Girard). Cotype of *Moniana gracilis* Girard.

Fig. 19—*N. lutrensis* (Baird and Girard). Type of *Cyprinella billingsiana* Cope.

Fig. 20—*N. lutrensis* (Baird and Girard). Type of *Moniana jugalis* Cope.

Fig. 21—*N. lutrensis* (Baird and Girard). Type of *Cliola montiregis* Cope.

Fig. 22—*N. proserpina* (Girard). Cotype of *Moniana proserpina* Girard.

Fig. 23—*N. ludibundus* (Girard). Cotype of *Cyprinella ludibunda* Girard.

Fig. 24—*N. stigmaturus* (Jordan). Cotype of *Photogenis stigmaturus* Jordan.

PLATE XVIII—Fig. 25—*N. callistius* (Jordan). Cotype of *Photogenis callistius* Jordan.

Fig. 26—*N. caeruleus* (Jordan). Cotype of *Photogenis caeruleus* Jordan.

Fig. 27—*N. niveus* (Cope). Type of *Hybopsis niveus* Cope.

Fig. 28—*N. whipplii* (Girard). Cotype of *Photogenis spilopterus* Cope.

Fig. 29—*N. pyrrhomelas* (Cope). Type of *Photogenis pyrrhomelas* Cope.

Fig. 30—*N. cornutus* (Mitchill). Type of *Alburnops plumbeolus* Cope.

Fig. 31—*N. c. cerasinus* (Cope). Type of *Hypsilepis cornutus cerasinus* Cope.

Fig. 32—*N. c. cyaneus* (Cope). Type of *Hypsilepis cornutus cyaneus* Cope.

PLATE XIX—Fig. 33—*N. lacertosus* (Cope). Type of *Hybopsis lacertosus* Cope.

Fig. 34—*N. rubricroceus* (Cope). Type of *Hybopsis rubricroceus* Cope.

Fig. 35—*N. chlorocephalus* (Cope). Type of *Hybopsis chlorocephalus* Cope.

Fig. 36—*N. chiliticus* (Cope). Type of *Hybopsis chiliticus* Cope.

Fig. 37—*N. altipinnis* (Cope). Type of *Alburnellus altipinnis* Cope.

Fig. 38—*N. roseus* (Jordan). Example from Taylor's Creek, Fla.

Fig. 39—*N. chalybæus* (Cope). Example from Bristol, Pa.

Fig. 40—*N. c. abbotti* Fowler. Type.

PLATE XX—Fig. 41—*N. chrosomus* (Jordan). Cotype of *Hybopsis chrosomus* Jordan.

Fig. 42—*N. xanocephalus* (Jordan). Cotype of *Hybopsis xanocephalus* Jordan.

Fig. 43—*N. ariommus* (Cope). Type of *Photogenis ariommus* Cope.

Fig. 44—*N. swaini* Jordan. Cotype of *Alburnus megalops* Girard and *N. swaini* Jordan.

Fig. 45—*N. luciodus* (Cope). Type of *Photogenis luciodus* Cope.

Fig. 46—*N. stilbius* (Jordan). Cotype of *Nototropis stilbius* Jordan.

Fig. 47—*N. atherinoides* Rafinesque. Cotype of *Alburnellus jaculus* Cope

Fig. 48—*N. dilectus* (Girard). Type of *Alburnus oligaspis* Cope.

PLATE XXI—Fig. 49—*N. rubrifrons* (Cope). Type of *Alburnus rubrifrons* Cope.

Fig. 50—*N. rubrifrons* (Cope). Type of *Alburnellus percobromus* Cope.

Fig. 51—*N. photogenis* (Cope). Type of *Squalius photogenis* Cope.

Fig. 52—*N. photogenis* (Cope). Type of *Photogenis leucops* Cope.

Fig. 53—*N. p. amoenus* (Abbott). Example from Holmesburg, Phila., Pa.

Fig. 54—*N. micropteryx* (Cope). Type of *Alburnellus micropteryx* Cope.

Fig. 55—*N. lirus* (Jordan). Cotype of *Nototropis lirus* Jordan.

Fig. 56—*N. umbratilis ardens* (Cope). Type of *Hypsilepis ardens* Cope.